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The Home Vegetable Garden

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The Home Vegetable Garden

By E. S. Haber

AGRICULTURAL EXPERIMENT STATION
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VEGETABLE CROPS SECTION

AMES, IOWA

INDEX

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By E. S. Haber

Vegetables are healthful. Mineral salts present in vegetables are especially important; iron, calcium and phosphorus are present in sufficient quantities for the body's needs. Vegetables add bulk to the diet and furnish vitamins which are essential to the growth and health of the body.

A well planned and cared for garden will produce enough vegetables to supply the family during the growing season, and enough may be raised in excess for storing for winter use. Beets, carrots, turnips, parsnips, potatoes, late cabbage, etc., can be stored successfully. Fresh vegetables from the home garden are much more palatable than vegetables which have been shipped long distances or displayed for several days in the retail grocery window. The only means of securing the best peas, sweet corn, beans and asparagus is to grow them at home, since they deteriorate rapidly after gathering. Many vegetables lose their characteristic flavor unless used within a few hours after gathering.

SIZE OF THE GARDEN

The size of the garden will depend on available land. The farm garden may easily occupy one-half acre and supply enough vegetables for a medium sized family the year round. The garden on the city lot will necessarily have to be much smaller, but by intensive methods of cropping may be made to produce enough fresh vegetables during the growing season for a small-sized family.

Many farm gardens should be larger. Vegetable patches are often planted which are not large enough for the needs of the family because the labor required by a larger garden is thought to interfere with farm duties. The way to reduce labor is to increase the size of the farm garden and use field methods of tillage.

DEPENDABLE VARIETIES FOR THE HOME GARDEN

Asparagus
Mary Washington

Beans, bush
Wax or yellow podded varieties
1. Pencil Pod Black Wax
2. Wardwell's Kidney Wax

Green podded varieties
1. Bountiful
2. Stringless Green Pod

Beans, pole
Kentucky Wonder Wax
Kentucky Wonder

Beans, lima
Burpee Improved Bush
Fordhook Bush
Henderson's Bush
King of the Garden Pole
Early Leviathan Pole
Carpinteria Pole

Beets
Crosby's Egyptian
Detroit Dark Red

Cabbage, early
Copenhagen Market
Golden Acre
Early Jersey Wakefield

Cabbage, late
Late Flat Dutch
Danish Ballhead

Cabbage, Chinese (celery cabbage)
Wong Bok
Pe-Tsai

Cabbage, yellows-resistant
Iacope—early
Marion Market—early
Wisconsin Hollander No. 8—late

Carrots
Chantenay
Ox Heart
Danver's Half-long
Amsterdam Coreless

Cauliflower
Early Snowball
Early Dwarf Erfurt

Celery
Golden Self-blanching
Easy Blanching
Winter Queen
Giant Pascal

Chard
Lucullus

Corn, sweet
Sunshine
Golden Bantam
Crosby
Stowell's Evergreen
Country Gentleman

Cucumbers
Davis Perfect
White Spine
Improved Long Green
Chicago Pickling

Egg plant
Black Beauty
Neapolitan

Kale
Dwarf Scotch

Kohlrabi
White Vienna

Lettuce, leaf
Grand Rapids

Lettuce, head
Iceberg
New York Wonderful
Big Boston

Muskmelon
Hearts of Gold
Pollock 10-25
Hale's Best
Tip Top

Mustard
Giant Curled

Okra
White Velvet

Onions
Southport Globe
Yellow Prizetaker
Red Globe

Onions, Bermuda
Crystal White Wax
Yellow Bermuda

Parsnips
Hollow Crown
Guernsey

Parsley
Moss Curled
Double Curled

Peas
Alaska
Little Marvel
Gradus
Thomas Laxton

Peppers
Ruby King
Chinese Giant
Cayenne
Pimento

Potatoes, early
Irish Cobbler
Early Ohio

Potatoes, late
Rural New Yorker

Pumpkins
Connecticut Field
Small Sugar Pie

Radishes
Scarlet Globe
White Icicle
Scarlet Turnip (white tips)
Rose Chinese (winter)

Rhubarb
Victoria
Linnaeus

Salsify
Mammoth Sandwich Island

Spinach
King of Denmark
Bloomsdale
Victoria
New Zealand

Squash, summer
White Bush
Summer Crookneck

Squash, winter
Table Queen (Des Moines)
Chicago Warted Hubbard
Banana
Marblehead

Sweet Potatoes
Nancy Hall
Yellow Jersey
Red Jersey
Prolific

Tomatoes
Bonny Best
Earliana
Marglobe
Stone
John Baer
Greater Baltimore

Tomatoes, wilt-resistant
Marglobe (red)
Marvelosa (pink)

Turnips
Purple Top White Globe
Purple Top Strap Leaf
Early Milan
Early White Flat Dutch

Watermelons
Kleckley Sweet
Halbert's Honey
Tom Watson
Irish Gray
Thermond Gray

PLANNING THE GARDEN

The city lot garden is of necessity close to the dwelling, but many farm gardens are located too far from the house. A suitable area for the vegetable garden is available close to the house on most farmsteads. Fig. 1 is a suggested farm garden where horse-cultivation may be used for all the crops grown. Fig. 2 is a suggested city lot garden.

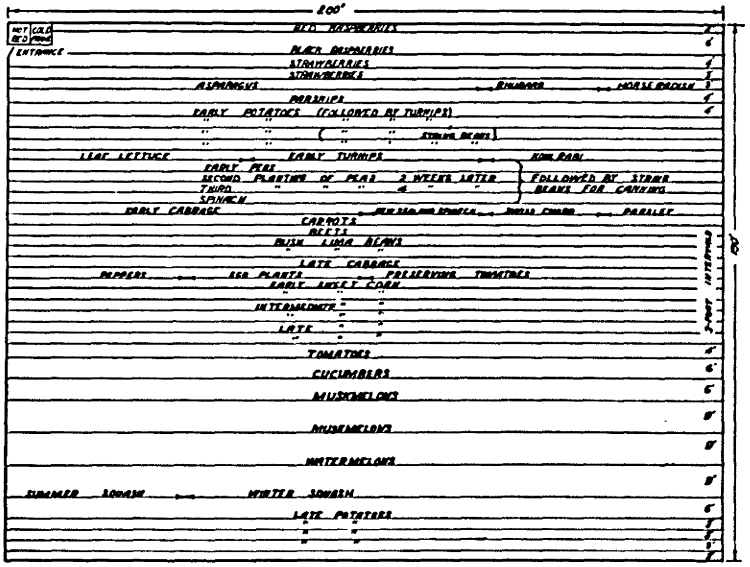


Fig. 1. Farm garden plan whereby hand labor is reduced to the minimum.

SOILS

Most of our Iowa soils may be made suitable for the home garden.

Light or sandy loam. These soils warm earlier in the spring, mature their crops quickly, are easily tilled, do not compact after rains or from tramping, and the root crops are much cleaner at harvesting. Smoother, more attractive roots and tubers are produced on light soils. However, the light soils are often deficient in plant food and require considerable fertilizer, they dry out rapidly, and if there are no provisions for watering the vegetables may suffer.

Heavy or clay loam. The heavier types of soil are slow in warming in the spring, are relatively fertile, usually produce higher yields but are more difficult to work and mature their crops later.

Peat and muck soils. A small area of peat or muck soil is often available for the farm garden, but a great deal more care in the use of commercial fertilizer is necessary on this type of soil. Commercial fertilizers are necessary, especially phosphates and potash, to balance the soil fertility, since these soils are rich in nitrogen and often correspondingly low in phosphorous and potassium. The peat or muck soils are particularly well adapted to the production of potatoes when the correct commercial fertilizer is used. This type of soil requires skill in management, and the farm garden will usually produce better crops if a loam soil is chosen.

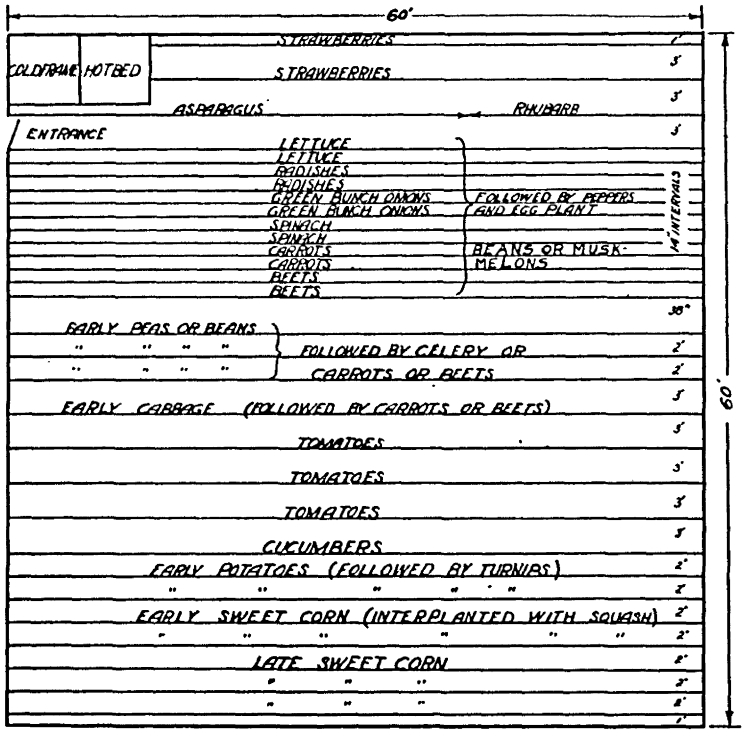


Fig. 2. A plan for a small home garden.

FERTILIZERS

Animal manures. The best general vegetable crop fertilizer is barnyard manure. If manure is available, 10 to 20 loads to the acre each year are not too much. Fresh manure should not be used immediately before planting potatoes, as it encourages potato scab. Manure makes a light type of soil more retentive of moisture, as it acts like a sponge in holding water in the soil; it also furnishes plant food and tends to make a heavy soil more friable, porous and earlier to work.

Sheep and poultry manures are much more concentrated than cow or horse manure and should be used in much smaller quantities. Poultry manure, if entirely free from litter, should be used sparingly because it is apt to burn the plants. Poultry manure is valuable for garden purposes, but a ton per acre broadcast would be equal in plant food content to five or six tons of horse manure which contained litter. Sheep manure free from litter is not as rich as poultry manure but contains more plant food than horse manure. Cow manure is available for many farm gardens and is of high value but contains more water and less plant food than any of the

other animal manures. Because of its slow fermentation it is valueless for hotbed work. Animal manures should be turned under immediately after spreading on the garden.

Green manures. Where the space devoted to the garden is not limited, green manures may be substituted in part for the animal manures. One-fourth or more of the land may be planted to cowpeas or soybeans each year and turned under in the fall. In smaller gardens the cowpeas or soybeans may be sown following the early vegetables. The animal manures are better, but the green manures may be substituted in part when the animal manures are insufficient.

Commercial fertilizers. The use of commercial fertilizers on the garden is often advisable. Nitrate of soda or sulfate of ammonia are useful in forcing quick growth of leafy crops such as lettuce, cabbage and spinach, and on plants which have been transplanted to the garden, such as tomato, pepper and celery plants. The nitrogenous fertilizers may be applied as a top-dressing around the plants or, in a solution of 1 pound of nitrate of soda or sulfate of ammonia in 25 gallons of water, it may be sprinkled around the plants. The latter method is the safer for application of small amounts on account of the fact that an excess of nitrates may cause burning or an excess of leafy growth on such plants as tomato or pepper; only light applications should be given. The nitrates must not come in contact with the leaves or the stem of the plant or they will cause burning. When the nitrates are broadcast, 100 to 150 pounds per acre or a pound to the square rod is sufficient.

For root crops, such as potatoes, carrots and turnips, grown on soils other than muck or peat, superphosphate (acid phosphate) at the rate of 200 to 300 pounds per acre with animal manure often gives good results. If the manure is not available, a 3-12-4 fertilizer at the rate of 500 pounds per acre is often found advantageous. For root crops, especially potatoes, on peat or muck an 0-9-27 or 0-8-24 fertilizer used at the rate of 500 pounds per acre is necessary, since these soils are high in nitrogen and deficient in potash and phosphates.

Lime. When considerable quantities of animal or green manures are used in the garden year after year it is usually necessary to lime the soil every five or six years. Ground limestone is the most economical to use, but on the small backyard lot garden hydrated lime or air-slaked lime may be used if crushed limestone is not available. Lime should not be applied to land to be immediately planted in potatoes, since potato scab is much worse on limed soils. A slightly acid soil is usually better for potatoes.

PLOWING AND CULTIVATING

Thoro, deep plowing or spading is necessary for the proper development of all vegetable crops and especially root crops. The ground should be worked into a very fine state of tilth, especially where small seeds, such as lettuce, radish, spinach, etc., are to be sown. Frequent, thoro cultivation is necessary in order to keep down weeds and to prevent the ground from cracking and losing moisture. The ground should be stirred by shallow cultivation after rains as soon as it is possible to work the soil. Frequent cultivations and weeding will make the garden profitable.

HOTBEDS AND COLDFRAMES

Hotbeds are used for starting plants to be transplanted to the field, such as tomato, pepper, eggplant and early cabbage. Hotbeds should be located on well-drained soil and should have a southern exposure. They should be located near the dwelling, so they can be cared for with the least trouble. Water must be available to moisten the soil in which the young seedlings are growing. They must be protected from cold winds by a windbreak on the north and west sides. If a natural windbreak is not present a tight board fence five feet high will serve.

Most hotbeds are heated by the fermentation of horse manure. Fresh horse manure is the best. It should consist of a 2 parts excrement to 1 part straw or other litter. Manure with shavings is usually not satisfactory. The manure should be prepared for the

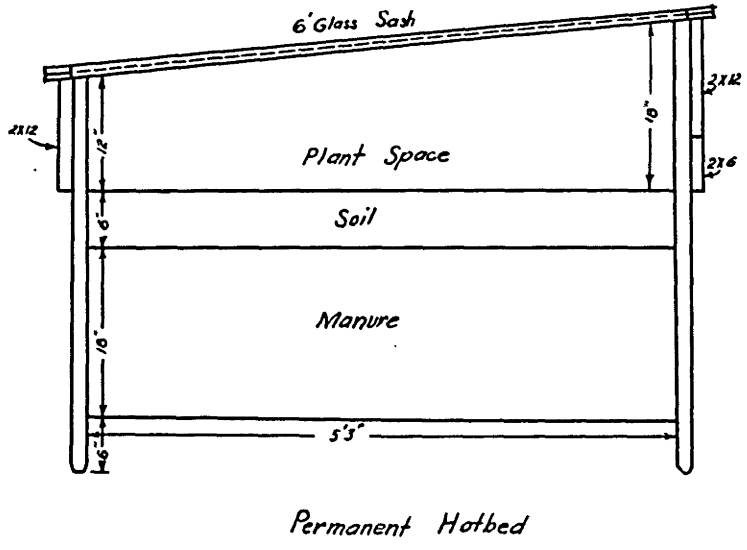
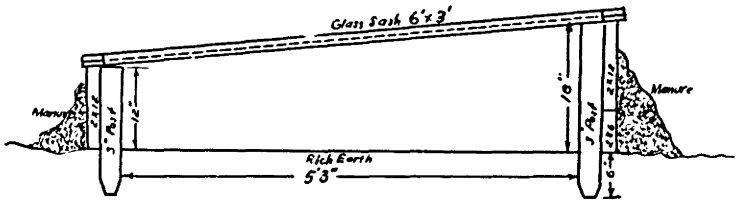


Fig. 3. Permanent hotbed.



Cold Frame

Fig. 4. Cold frame.

hotbed about 10 days before it is needed. Pile the manure in a flat pile 4 or 5 feet wide and any length desired. If the manure inclines to be dry, as is usually the case, moisten it thoroly without soaking, in order to start fermentation. In two or three days the fermentation will be well under way, as evidenced by steam coming from the pile. Turn the pile over then to insure uniform heating thruout. In two or three days after turning, it will be ready for the pit. A standard hotbed sash is 6 feet x 3 feet, so that the width of the pit should be 6 feet. The length of the pit depends on the number of sashes to be used and the number of plants to be grown. The use of two sashes making the hot bed 6 feet x 6 feet will produce enough tomato, early cabbage, eggplant and pepper plants for the farm or home garden.

In making the frame, 2 x 4 inch lumber is used for posts. One inch or 2 inch planks are used for the side boards and ends. Every 3 feet a cross bar should be placed for the sash to rest on. Durable wood should be used for the construction of the frame. Concrete or brick may be used for the construction of the frame but are more expensive than wood.

The sash should be painted before being glazed. The 3 x 6 foot sash is usually made for 3 rows of 10 x 12 inch glass. These panes should lap ⅛ inch so that water will drain off. The glass is fastened by glazing points, and then putty is applied along the edges of the glass next to the sash bars to prevent entrance of rain. Straw mats or boards which may be covered with straw should be available to place on the sash at night during unusually cold weather. Old carpets or burlap may be used in place of the straw mats, if more convenient.

The cold frames are used for starting late plants and for hardening off plants grown in the hotbed or greenhouse. No pit is required for the cold frame. It is similar in other respects to the hotbed except that no artificial heat is required. The frame and sash are identical with those used in the hotbed. Cloth may be substituted for glass for use during the month of April, in Iowa. This may be removed during the warm part of the day and placed on again at night to prevent damage by frost. Cabbage and cauliflower plants may be hardened off in cold frames where cloth sashes

are substituted for glass sashes. Tomatoes, peppers and eggplants should have the protection of glass sashes.

When the hotbed has been completed, the sashes should be placed on the frames and the seed sown when the temperature reaches 90° F. The seed may be sown in the hotbed soil or in flats which may be placed in the hotbed.

Ventilation and watering of the hotbed is extremely important. The amount of ventilation depends on weather conditions. In early spring only a little ventilation may be necessary, but as the season advances the sashes may be removed from the frame on warm sunny days. Two weeks previous to setting the plants in the field, they should be shifted to the cold frame for "hardening off" if other tender plants which are not yet ready for transplanting remain in the hotbed. However, the hotbed may be used as a cold frame for "hardening off" plants if all plants in the frame are ready for the field. Removal of sashes both night and day when weather is favorable will harden the plants.

After seed sowing and transplanting, the soil should be thoroly watered. Watering once a week is usually sufficient during March and early April, but later it may be necessary to water every 2 or 3 days. Extremely moist conditions may cause the seedlings to "damp off." Keep the soil moist enough to keep the plants growing, but do not use so much water that the soil becomes soggy. While "hardening off" by removal of the sashes, water less frequently, but do not allow the plants to wilt. A few hours before transplanting to the field give the plants a good soaking.

SEED AND SEED PLANTING

Good seed is very important in securing good vegetables. Cheap seed is more expensive in the long run. Buy seed from well known and reliable firms. Some seeds retain their vitality much longer than others. Pumpkin, squash and cucumber seeds retain their vitality much longer than parsley, parsnip or onion. Conditions under which the seeds are stored will affect the vitality. Seeds should be stored in a cool, dry place if left over from one year to the next. Seed left over from the previous year should be given a germination test before using.

A general rule to follow in the sowing of seeds is to plant them at a depth four times the diameter of the seed. However, the type of soil will influence the depth of seed planting. Seeds must be sown much shallower in heavy soils than in sandy soils. In the planting table will be found the planting depths for the various vegetable seeds. In the farm garden, the use of a garden seed drill will save a great deal of time in sowing the seeds. The drill is very easily adjusted to sow all kinds of garden seed.

In the backyard garden the rows of carrots, beets, parsley, lettuce, etc., may be sown as close as 12 inches apart. In the farm garden if all rows are spaced far enough apart to permit cultivation with a single horse cultivator, much hand labor will be avoided and time

saved. If the seedbed is prepared to a fine degree of tilth and if there is proper cultivation after sowing, carrots or beets will grow as well when the rows are 2 feet apart as they will when they are 12 to 15 inches apart. Where economy of space is no object, everything should be sown or planted in order to utilize horse labor.

TRANSPLANTING AND THINNING

Plants started in boxes, hotbeds or cold-frames should be transplanted when they are 1 to 2 inches high. This will tend to make the plants more uniform in size and to produce a well-developed root system. The seedlings should be transplanted to boxes or to the hotbeds and cold-frames to stand about 2 inches apart each way. Sometimes it is necessary to transplant twice if conditions will not permit transplanting to the field. Tall, spindly plants will result from crowding.

In transplanting to the field, one should allow as much dirt as possible to adhere to the roots. The plants will suffer less from transplanting if the disturbance of the root system is kept to the minimum. Transplanting seedlings into pots or paper bands in the hotbeds or coldframes is a good practice when space and time will permit because well-developed root systems will result and be less disturbed when the plants are transplanted to the garden.

The holes for the plants should be made just before planting in order to prevent the soil from drying out. When the soil is very dry it is advisable to use a little water in the holes. When possible, set the plants on a cloudy day or just before nightfall. If it is necessary to transplant during hot weather, shade the plants from the hot sun if possible.

Frequently it is necessary to reduce the leaf surface of transplanted plants to avoid excessive loss of moisture from the plant tissues. This will depend on the condition of the plants and the weather. If the soil is moist and the weather cloudy and cool, trimming off some of the leaves may not be necessary. If the root system has not been disturbed by transplanting as with pot-grown

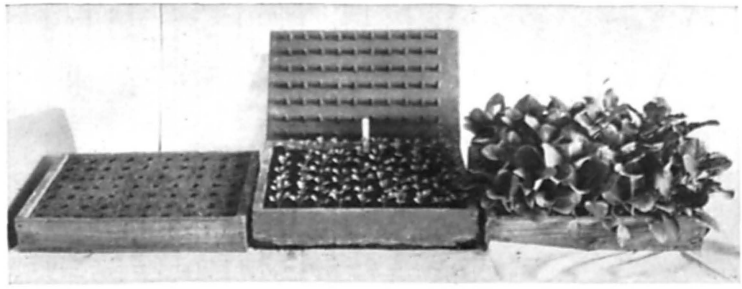


Fig. 5. Cabbage plants transplanted into flats. The pegs on the planting board are spaced 2 inches apart each way. The flat on the right contains plants ready for setting in the field.

TABLE 1. PLANTING TABLE

Crop	Seed per 100 feet of row		Planting distance between rows		Depth to plant in inches	Distance in row inches	Plant seed		Transplant to field	Days required to mature from seed
	Seed	Plants	Horse Cul.	Hand Cul.			In open field	In hotbed		
Asparagus roots	-------	66	36-48	36-48	8-10	18-24	-------	-------	-------	3 years
Beans, Bush	1 qt.	-------	30-36	18-24	1-1½	2-3	May 1	-------	-------	45-65
Beans, Bush Lima	1 qt.	-------	30-36	18-30	1-2	4-6	May 1-15	-------	-------	50-70
Beans, Pole	¾ pt.	-------	36-48	36	1-2	36-48	May 1	-------	-------	45-65
Beans, Pole Lima	¾ pt.	-------	36-48	36	1-2	36-48	May 1	-------	-------	65-80
Beets	2 oz.	-------	24-36	12-18	1	2-3	April 1	-------	-------	60-110
Brussels Sprouts	¼ oz.	66	36	20-28	½-½	18	-------	Feb. 15	April 1-15	90-110
Cabbage, Early	¼ oz.	66	24-36	20-28	½-½	18	-------	Feb. 1-15	April 1-15	90-120
Cabbage, Late	¼ oz.	50-65	36-42	24-32	½	24-30	June 1	-------	July 1-15	100-135
Cabbage, Chinese	⅛ oz.	100	24-28	18-24	½	12-15	July 1-15	Feb. 15	April 1-15	80-100
Carrots	½ oz.	-------	24-28	12-18	½	2-3	April 1*	-------	-------	60-120
Cauliflower	¼ oz.	66	36-42	24-30	½	18	-------	Feb. 15	April 1-15	100-120
Celeriac	¼ oz.	200	36	24	⅛	6	-------	Feb. 15	April 1-15	125
Celery	¼ oz.	200	36-48	20-24	⅛	4-8	-------	F. 1-A. 1	A. 15-J. 15	120-150
Chard, Swiss	1 oz.	-------	24-30	15-18	1	6-8	April 1-15	-------	-------	50-120
Corn, Sweet	½ pt.	35-65	36-42	30-36	1-2	18-24	May 1-15	-------	-------	75-90
Cucumber	½ oz.	20-25	48-60	48-60	1	48-72	May 15	-------	-------	90-130
Eggplant	¼ oz.	50	30-36	24	½	24	Mar. 1	-------	May 15	150-160
Endive	½ oz.	100	24-28	14-18	½-1	8-12	April 1	-------	-------	60-90
Horseradish roots	-------	70	30-36	24-30	3-4	14-20	-------	-------	April 1-15	120-140
Kale	¼ oz.	100	24-30	15-24	½-1	12-24	April 1*	-------	-------	90-100
Kohlrabi	¼ oz.	150	24-28	15-24	½	4-8	April 1	Feb. 15	April 1-15	-------
Leek	¼ oz.	-------	24-28	12-18	1	4-6	April 1	-------	-------	60-90

TABLE 1—Continued

Crop	Seed per 100 feet of row		Planting distance between rows		Depth to plant in inches	Distance in row inches	Plant seed		Transplant to field	Days required to mature from seed
	Seed	Plants	Horse Cul.	Hand Cul.			In open field	In hotbed		
Lettuce	½ oz.	200	24-28	12-15	½	4-8	April 1*	Feb. 15	April 1	140-180
Muskmelon	½ oz.	20-25	48-60	48-60	1	60-72	May 15	April 15	May 15	90-120
Mustard	½ oz.	-------	24-28	12-15	½	2-3	April 1*	----------	----------	60-90
Okra	1 oz.	50	30-36	30-36	1	24	May 15	----------	----------	90-140
Onion Seed	1 oz.	-------	24-28	12-15	½-1	2-3	April 1	Feb. 1	April 15	140-160
Onion Set	2 qt.	-------	24-28	12-15	1	2-3	----------	----------	April 1	45-75
Onion, Bermuda	1 oz.	400	28-36	12-15	1	2-3	----------	Feb. 1	April 1-15	130-150
Parsley	½ oz.	100-200	28-36	12-18	⅛	3-6	April 15	----------	----------	90-100
Parsnips	½ oz.	-------	28-36	18-24	½-1	3-5	April 1-15	----------	----------	140-160
Peas	1-2 pt.	-------	30-36	24	1-2	1-2	April 1	----------	----------	75-100
Peppers	½ oz.	66	30-36	24-28	¼	15-20	----------	Mar. 1	May 15	140-160
Potato, Irish	5-8 lb.	-------	28-36	12-18	3-4	12-18	April 1*	----------	----------	120-140
Potato, Sweet	-------	65-75	36-48	36-48	3-4	14-18	----------	April 1	May 15-30	140-150
Pumpkin	½ oz.	10-15	8-12	8-12	1	84-108	May 15	----------	----------	90-120
Radish	1 oz.	-------	24-36	12-18	½-1	1½-2	April 1*	----------	----------	30-65
Rhubarb Plants	-------	33	36-60	36-60	2-3	36-60	----------	----------	April 1	365
Salsify	1 oz.	-------	30-36	18-24	½-1	2-4	April 1	----------	----------	140-160
Spinach	1 oz.	-------	30-36	12-18	1	2-4	Mar. 15-30	----------	----------	60-80
Spinach, N. Zealand	1 oz.	-------	30-36	30-36	1	12-18	April 15-30	----------	----------	60-150
Squash, Summer	½ oz.	20-40	36-48	36-48	1	36-48	May 15	----------	----------	60-65
Squash, Winter	½ oz.	10-35	84-108	84-108	1	84	May 15-30	----------	----------	125-140
Tomatoes	¼ oz.	25-35	36-60	36-48	¼	36-48	----------	Mar. 15-30	May 15-30	150-170
Turnips	½ oz.	-------	24-36	18-24	¼-½	-------	Aug. 1†	----------	----------	60-80
Watermelon	1 oz.	33	96-144	96-144	1	84-108	May 15-30	April 1-15	May 15	100-130

*Succession plantings may be made.

†Planting date for fall crop.

plants or plants grown in paper bands, reduction of leaf surface is not necessary. If the weather is hot or the soil dry, reduction of the leaf surface will prevent excessive wilting of the plants.

It is a good policy to sow seed thick in order to insure a good stand of plants, but there is a tendency to leave plants which have been grown from seed too thick in the rows. Thinning to proper distances at the right time will insure larger yields of attractive vegetables. Carrots, onions, beets, parsnips and similar vegetables require thinning when the plants are quite small. Thinning is often deferred in order to make use of the thinnings, but this is a serious error. The crowded seedlings do not reach edible size as soon as they would if not crowded. If thinning is delayed until the plants are quite large, the result is a serious disturbance of the root systems of the plants left in the row, which checks growth. A preliminary thinning as early as possible, leaving the plants twice as thick as they are eventually to stand, may be practiced with beets, carrots and onions if the grower desires, but parsnips and salsify should be thinned to the proper distance at the first thinning. The distance left between the plants will depend on the kind of vegetable and the size desired at harvest. Onions should be spaced 2 to 3 inches apart when large, dry bulbs are desired. Beet, parsnip and carrot plants should stand at least 2 inches apart. In both farm and city gardens the usual error is failure to thin enough.

WATERING

Water supply is the most important factor in vegetable production. To secure maximum growth of vegetables, the summer rainfall must be well distributed or else some artificial means of applying water is desirable. On most farms a liberal supply of water for the vegetable garden is not available, but the city gardener usually has access to water. When watering the garden either with a hose or overhead sprinkling pipe, soak the soil thoroly. During periods of drouth a good soaking once or twice a week is usually sufficient. Light sprinkling occasionally or daily may cause the roots to grow near the surface, where they quickly exhaust fertility of the soil. The soil temperature is higher near the surface and may react against the growth of cool rooted crops.

SUCCESSION AND ROTATION OF CROPS

All of the ground in the garden should be fully occupied all of the season. This may not be as important with the farm garden as with the city lot garden. As soon as an early vegetable is harvested something else should take its place. The following grouping of vegetables indicates which ones may precede or follow others.

Crops Occupying the Ground All Season

Asparagus	Eggplant	Peppers
Rhubarb	Sweet Potato	Pumpkins
Horse-radish	Okra	Salsify
Beans, pole snap	Onions (perennial)	Squash
Beans, pole lima	Onions (dry bulb)	New Zealand spinach
Muskmelons	Parsley	Tomatoes
Chard	Parsnips	
Cucumbers	Watermelons	

Crops Which Occupy the Ground for Only a Part of the Season and May Be Followed by Others

Beans, bush	Cauliflower	Turnips
Beets	Corn (early varieties)	Onions (green bunch)
Cabbage	Kale	Peas
Radishes	Kohlrabi	Potatoes
Carrots	Lettuce	Spinach

Late Crops Which May Follow Others

Beans, bush	Carrots	Potatoes (late)
Beets	Corn	Radishes
Cabbage	Celery	Spinach
Cucumbers (pickling)	Kale	Turnips
Cabbage (Chinese)	Lettuce	

If all of the early crops are grouped together, on their removal the ground may be planted as a unit to some other crop. It is advisable to follow the first crop with some dissimilar crop in order to help in the control of insects and disease.

CULTURE OF VEGETABLES

Perennial Root Crops

Asparagus. This is best propagated from seed. Altho division of roots is occasionally used, it is not recommended. Large, thrifty one-year-old roots are most satisfactory. These can be obtained by sowing the seed thinly in the spring on rich soil and transplanting to the permanent asparagus bed the following spring or one year old seedlings may be purchased from a reliable nurseryman. Asparagus will thrive on any rich soil that is well drained. Place the rows 4 feet apart and the plants 18 inches in the row. Dig a furrow 8 inches deep for the plants. Cover the roots with 2 to 3 inches of soil and pack firmly. As the tops continue to grow, fill the trench gradually until the ground level is reached.

Cutting the shoots should be delayed until the third spring after planting. Cutting before this will stunt the crown for further production. Cropping should cease about the middle of June and the tops be allowed to grow. When freezing has killed the tops in the fall they should be mowed off and burned. For best results asparagus requires a very fertile soil. After the cutting season is over it is well to top-dress heavily with manure. An application of nitrate of soda, 100 pounds per acre, when growth starts in the spring is advantageous as the plantation gets older. Salt is often used on asparagus but is of no value except to kill off a few weeds. Asparagus is tolerant to salt, but the salt is not necessary for its growth.

Rhubarb. Division of roots is the best method of propagation, as this plant does not come true to type from seed. Roots or clumps may be cut into as many pieces as there are eyes or buds. Every piece must have one bud, but two or three buds are better. The plants should be set in a rich soil in the spring in rows 3 or 4 feet apart and the plants the same distance apart in the row. The roots should be spread out and the plant covered with 3 inches of

soil. No crop should be removed the first two seasons. Rhubarb is a heavy feeder, and heavy applications of manure are profitable. The stalks should be pulled and not cut or broken off above ground, as the cut or break is a possible source of infection from crown rot organisms.

Rhubarb Forcing. Rhubarb is easily forced in a hotbed or cellar where a temperature of 45 to 50° F. can be maintained. The roots should be dug in the fall before the ground freezes solid. The roots should be piled in the field and allowed to freeze solid for several weeks. Freezing is necessary. Place the roots together as close as possible in the forcing bed and fill in around the clumps with garden soil to keep them from drying out. Roots will produce shoots in 3 to 4 weeks and continue to produce for 4 to 5 weeks. Roots which have been forced are not very satisfactory for resetting in the field.

Horse-radish. It is a hardy perennial of the simplest culture. A rich, deep, sandy loam soil furnishes the best conditions for the development of symmetrical roots. Propagation is by root cuttings, often called "sets," 10 to 12 inches in length and ½ to ¾ inch in diameter. The cuttings are planted in a shallow furrow in a slanting position with the upper end of the root within 1 or 2 inches of the surface of the soil. The plants should be set 18 inches apart in the row with the rows 3 feet wide. The roots may be stored in a cave or pit over winter or dug as needed.

Cole Crops

Cabbage. For the early crop the seed should be sown in the hotbed or a window box and set out when the second or third true leaves appear. The seed should be sown and the plants "hardened off" so that they may be set in the ground as soon as the state of the soil will permit working. The seed for the fall crop or late varieties may be sown in a seed bed prepared in the field about the middle of May. Plants are usually set 18 inches apart in the row with 3 feet between rows.

Cauliflower. The culture is the same as for cabbage. It is a cool-weather crop and will not produce good heads in hot weather. To prevent burning of the heads by the sun, tie the leaves over the head.

Brussells Sprouts. This is likewise a cool season crop, and cultural directions are the same as for cabbage.

Kohlrabi. This is a member of the cabbage family which produces a turnip-shaped stem above ground. Its flavor is similar to a very mild turnip. The seed may be sown in the hotbed and plants transplanted to the field, but more often the seed is sown in the field and the plants thinned to 6 to 8 inches in the row. The crop should be harvested when the edible portion is about 3 inches in diameter. When too large they become pithy and stringy.

Salad Crops

Lettuce. This is a cool-season crop. Head lettuce ordinarily does not head up satisfactorily under corn-belt conditions. Leaf lettuce

may be sown in the spring as early as the ground will permit. Successive plantings every two weeks until warm weather will provide an ample supply.

Celery. The cultural demands are very exacting for this crop. Essential requirements are a rich, moist soil and cool season. Irrigation or watering is necessary to produce a satisfactory crop. The seed should be sown in the hotbed early, as the seed germinates very slowly. When the second pair of leaves have been produced, the seedlings should be transplanted in the flats or beds, placing the plants about 2 inches apart. When 4 or 5 inches high, weather permitting, transplant to the field, setting the plants 6 inches apart in the rows. Keep the plants free from weeds and well cultivated. When the plants of the early or self-blanching varieties have reached a good size, boards or heavy paper, even several thicknesses of newspaper, placed around the plants to exclude the light will blanch them in 2 or 3 weeks. Celery is a heavy feeder and stable manure is an excellent source of fertilizer.

The late varieties such as Giant Pascal are suitable for storing. Light frosts are not harmful, but the plants must be harvested for storage before heavy freezing occurs.

Endive. This should be grown as a late fall crop, rather than in the spring under Iowa conditions. Sow the seed in the field in rows 14 to 18 inches apart and thin the plants 6 to 10 inches in the row. Culture is similar to that of lettuce. To blanch it in the fall tie the outer leaves together at the top and harvest when the inner leaves are blanched.

Chinese Cabbage. (celery cabbage). It is a cool season crop. The early crop may be handled as for early cabbage. However, under Iowa conditions it does better when sown as a fall crop. Sow July 15 in the field and thin the plants 12 to 15 inches apart in the row. It is easily grown and usually only attacked by plant lice, which may be controlled by spraying with nicotine sulphate or dusting with nicotine dust.

Crops Used for Greens

Spinach. It is a cool season crop and goes to seed quickly in warm weather. Sow as early as possible in the spring and after Sept. 1 for the fall crop. It matures quickly and requires little care other than one or two cultivations. It matures quickly enough to require no hand weeding. Aphis, or plant lice, may bother spinach, but as a rule it is free from insect attacks.

New Zealand Spinach. This is a hot-weather plant which is well adapted to the garden as a source of summer greens. The plants are much branched, spreading often 3 or 4 feet across. The seed may be sown in the field or in pots and the plants transplanted to the field. The root system should be disturbed as little as possible in transplanting. The plants should set 2 feet apart in the row and the rows at least 3 feet apart. Cutting may begin as soon as the plants are large enough to enable one to cut off the tender tips

of the branches. Do not cut too close and the plants will grow all summer and produce a generous supply of greens.

Swiss Chard. This is a foliage beet which produces large, fleshy leafstalks and broad, crisp leaf blades. It withstands hot weather. Sow the seed in the field as soon as danger from hard frosts are over. Cut off the outer leaves an inch or two from the ground while they are still tender. Do not injure the bud and the plants will continue to produce all summer.

Kale. It is grown for its leaves, which are used for greens. It is best grown as a fall crop. Sow the seed in the field and thin the plants to stand 8 inches apart.

Root Crops

Beets and Carrots. It is possible to have beets and carrots from early spring until fall, and the culture and care are very simple. To obtain well-shaped, large specimens, sow the seed thick, and thin the plants 2 to 4 inches in the row.

Parsley. The seed should be planted in early spring in 12 to 14 inch rows and the plants thinned to 4 to 5 inches in the row. Parsley will continue to produce leaves all summer and fall. Before the ground freezes the roots may be dug and stored for use as flavoring.

Parsnips and Salsify. A deep, sandy loam is best adapted to the production of long well-formed roots. The seed for both should be sown early in the spring, as they require the full season for maturity. The general cultural requirements are the same as for carrots and beets. The roots of both may be dug and stored or left in the ground over winter. The roots of the parsnip are improved in quality by freezing. Salsify is grown principally for its value in the flavoring of soups. It is often called "oyster plant" or "vegetable oyster" on account of its oyster-like flavor.

Radishes. To produce crisp, tender roots the radish requires a cool, moist season of growth. Sow early in the spring and repeat at intervals of 10 days for successional crops. Early varieties mature in from 20 to 30 days. Winter varieties with a long tapering root are grown to a limited extent, requiring a much longer season of maturity. Because the radish matures quickly, very little trouble is experienced from diseases or insects.

Turnips. It is a cool-season vegetable and does best most seasons in Iowa as a fall crop sown about Aug. 1. The roots develop better on light types of soil. Plenty of moisture is necessary to secure proper development of roots.

Celeriac, commonly called turnip-rooted celery, is used mostly for flavoring soups. The crop is handled similarly to celery except that the tops are not blanched. The roots will withstand freezing, but for best results they should be harvested and stored before hard freezing occurs.

Tuberous-rooted Crops

Potatoes. Iowa State College Extension Service Bulletin 128, "Twice as Many Potatoes Per Acre," discusses the subject of potato growing much more fully than space permits here.

Sweet Potatoes. A light, warm soil rich in organic matter is essential. Cold or heavy clay soils are unsuccessful. The sweet potato is usually propagated from shoots started in hotbeds. The tubers are placed quite close together and covered with 2 to 3 inches of light soil or sand. The shoots are taken off when 3 to 4 inches in height and transplanted to the field when the ground becomes warm and all danger of frost is past. The ridge system of planting secures a warmer soil and is an advantage, especially in wet seasons. There is little difference between crops which have had the vines cut to prevent rooting and those which have been allowed to grow naturally.

The tubers should be harvested before frost. They bruise easily and require careful handling. They require a higher storage temperature than other root crops.

Bulb Crops

Onions. Sow the seed in the field as soon as the ground will permit. When the plants have reached a height of about 3 inches, thin to 4 inches apart. Careful hand-weeding is necessary to secure good crops. When the tops die off the crop is ready for harvesting. Pull the bulbs and allow them to remain in the field a couple of days to dry off before topping. After topping, allow them to dry off several days longer in the field or in a cool, dry, well-ventilated shed. A series of shelves, 4 inches in depth and with ample space between for free circulation of air, furnishes excellent storage. Store onions in a cool, dry place and do not allow them to freeze.

Onion sets may be planted rather than seed. Sets are produced by sowing the seed very thick on rather poor soil. On account of the crowded condition the young bulbs do not develop fully and growth is arrested when the bulbs are still small. To prevent the bulbs from becoming too large it is advisable not to sow the seed until June 1 to 15. Sets should not be over ¾ inch in diameter and preferably not over ½ inch. If the sets are too large, they will produce seed stalks when planted the following year. To produce dry bulbs from sets, the cultural requirements are the same as for onion seed. Bulbs grown from sets usually mature a couple of weeks earlier than those grown from seed. For further details on onion culture consult Bulletin 225 of the Iowa Agricultural Experiment Station.

Leek. This is a species of onion producing a straight stem. It is milder in flavor than the onion. It requires the entire season for growth and is grown from seed. Cultural requirements are similar to those of the onion. Leeks are marketed in bunches like green onions.

Garlic. It differs from the onion in that it produces instead of one

large bulb, a group of small bulbs or cloves, and the group is covered with a thin skin. It produces a seed stalk in which seed and bulblets are produced. Seed is seldom used for propagation, as bulblets and cloves give better satisfaction. Cloves are most commonly used.

Pulse Crops

Peas. These should be sown as soon as the ground can be worked, as peas are a cool season crop. Successional crops every two weeks from April 1 to May 15 can be sown in Iowa. A fall crop may be secured by sowing early-maturing varieties in August. The fall crop is seldom satisfactory in Iowa. For spring sowing both early and late varieties should be planted. Alaska, a smooth early, and Little Marvel, a wrinkled early, should be sown. For the late varieties, Gradus and Thomas Laxton are excellent sources.

Beans. Do not plant until all danger of frost is past. Both the common garden or kidney bean and the lima bean can be obtained in both bush and pole types. Lima beans require a longer growing season than the common bean, and the pole lima requires a longer season of maturity than the bush lima. The bush lima is usually more satisfactory year after year than the pole lima in Iowa. Kidney and lima beans are very easy to grow and do well in a wide range of soil types.

Vine Crops

Cucumbers and Muskmelons. The cultural requirements of these two are very similar. They are injured by frost, and the seed should not be planted until the soil is quite warm. Sow seed thick in hills 5 to 6 feet each way and thin to 3 plants when the plants begin to vine. A sandy loam is preferable for an early crop. If seed is sown in paper pots or berry boxes for transplanting to the field to secure earlier crops, care must be taken so as not to disturb the root system. The vine crops will not withstand disturbance of the root system. If manure is placed under the hill it should be well rotted and mixed with the soil.

Squash and Pumpkins. Culture is the same as for cucumbers and melons except that greater planting distances must be used. The hills should be 7 to 9 feet apart except for the bush types like the Patty Pan or Summer Crookneck, which may be planted 5 or 6 feet apart.

Watermelons and Citron. Culture is the same as for other cucurbits. Early maturing varieties are preferable in Iowa. Sandy loam soils mature the melons quicker than heavy types of soil.

Solanaceous Crops

Tomato. The plants are injured by frost and require a long, warm, moist season for growth. For early tomatoes the seed should be sown in the hotbed and transplanted in the hotbed or cold frame to 2 inches apart to secure a stocky plant with a good root system, Still earlier fruits may be secured by transplanting the seedlings to

pots in the coldframe or hotbed. On transplanting to the field the root system will not be disturbed and the growth of the plant is not checked. Seed may be sown in the field May 15 where the plants are to grow for very late tomatoes. Sow 4 or 5 seeds to the hill and thin to 1 plant when 4 to 6 inches high.

The distance between plants should be 4 to 6 feet each way unless the plants are staked, when they may be planted closer together. Thoro cultivation is necessary. Straw may be used to mulch the tomatoes, which will increase yield and lessen blossom-end rot of the fruit in a dry season when water is not available to irrigate with. Staking and pruning the tomato will increase the yield of early fruit but decrease the total yield of the plant. Sun-scald in late summer injures many fruits on pruned vines.

Egg Plant. The cultural requirements are the same as for tomato except seed cannot be sown in the field as the plants will not mature fruit requiring a long growing season.

Peppers. Cultural requirements are similar to those of egg plant and tomatoes.

Miscellaneous Crops

Sweet Corn. It is tender to frost and grows best in hot weather. Sow in hills or drills after danger of frost is past. Do not plant near field corn even tho it is not to be saved for seed. It crosses with the field corn, and the kernels fertilized by the field corn pollen mature faster and are starchy. Crossing with field corn is more troublesome with the late varieties. The kernels crossed with the field corn become hard while the sweet corn kernels are still in the "roasting ear" stage.

Popcorn. It is similar to sweet corn and field corn in its requirements. Do not use late maturing varieties in Iowa. Store the ears or shelled popcorn so as to hold the moisture content between 12 and 15 percent. Corn with too high or too low moisture content does not pop well. Store in a cool dry place in the barn or shed. Usually the corn dries out too much if stored in a warm house.

Okra and Martynia. The seed pods of these plants are the edible portion. Only the young tender pods are desired, as the older ones are woody and tough. They are tender plants and grow best in hot weather. Plant the seed in the field as soon as the soil becomes warm. Rows should be 2½ to 4 feet apart, and the plants should be thinned 12 to 18 inches apart in the row. The pods are used for gumbo soups.

STORAGE OF VEGETABLES

It is necessary to provide proper storage space for winter use of vegetables. Proper moisture, temperature, fresh air and a good product to begin with are essential for successful storage. Specific rules regarding moisture and temperature that will apply to all vegetables cannot be given. Rapid changes in temperature and moisture must be avoided in order to keep vegetables any length of time.

The house cellar is commonly used for storage of vegetables but

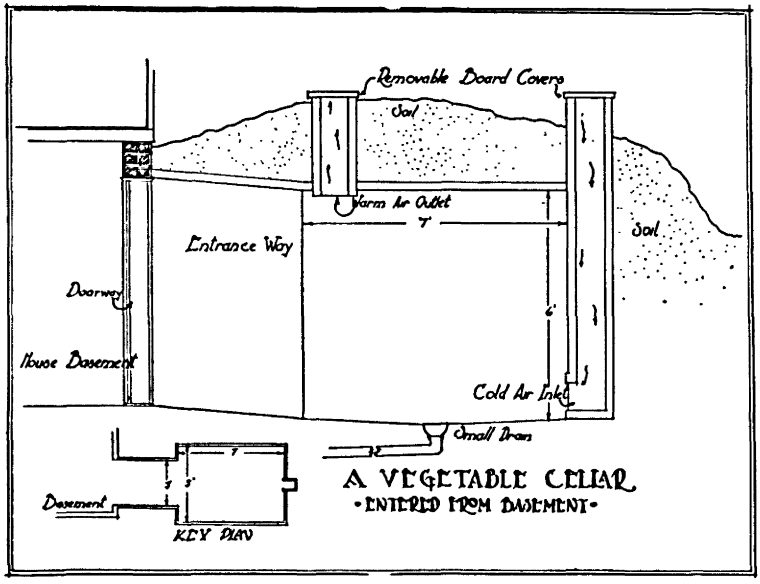


Fig. 6. A vegetable cellar which may be entered from the basement.

if it contains a furnace it will be a poor place except for sweet potatoes. Where there is a furnace, a separate room well-insulated from the furnace room may be partitioned off preferably under an unheated room. A special vegetable cellar or cave can be made outside the foundation walls under a porch, or with a roof of its own. Unless a temperature of 40 degrees Fahrenheit or less can be secured for most of the storage period it is not wise to try to store many vegetables.

Outside caves can be made which will serve satisfactorily for most vegetables that do not require a low humidity. The cave should have a door at one end only. It is almost impossible to prevent freezing if there are doors at both ends of the storage. The cave door should be well fitted, and a hatchway or door over the steps leading down to the cave door is desirable. At the back end a ventilator should be provided and a sewer tile will serve this purpose well. A drain tile is often necessary in the floor to carry off the seepage. A concrete or a brick floor is desirable.

Pits in the ground can be used for some vegetables which are not injured by freezing. A trench 3 feet deep and 3 feet wide and as long as needed may be dug in a well drained spot. Put the vegetables in the pit and then cover them with a foot of straw and a foot of earth. More layers of straw and dirt may be added when the weather becomes severe. At first in the fall cover only with a thin layer of straw to allow ventilation and avoid heating. Pits may be entered by chopping a hole thru the frozen earth at one end. After

removing part of the vegetables, cover the hole well with straw and earth. The main object with the pit storage is to prevent alternate freezing and thawing, which is damaging to the vegetables. Light freezing will not be injurious.

Potatoes. These are best stored in a moist cool cellar or storage cave. They will not stand freezing and should be dug before the ground freezes. The potatoes should be clean and free from dirt but should not be washed. Do not store them wet. If the moisture is too low, the potatoes will shrivel. If the temperature is too high, the eyes start to grow. When potatoes are stored in piles or bins, no potato should be more than 4 feet from air in order that the pile may be ventilated.

Cabbage. This vegetable is not injured by moderate frosts. Late, sound heads, solid and not too ripe, are best for storage. Pit storages are satisfactory for cabbage. The storage must not be too dry and should not fall far below freezing. Slow freezing and thawing are not injurious.

Onions. Onions should be kept dry and cold, without freezing; 40° to 50° F. is satisfactory. They should be well-cured before storing and topped about 1½ inches long. A well cured onion is firm and not readily dented at the base of the tops by the thumb. Pit storages are not adapted to onions because the humidity is too high and the temperature too low. Usually cave storages are not suitable. Conditions which are suitable for storing root crops are not suitable for onions.

Beets, Turnips, Carrots, Rutabagas, Winter Radishes and Kohlrabi. These will stand light freezing. Moisture must be plentiful to prevent evaporation. They must be clean and dry at the time of storage. They may be stored in sand to prevent drying out, if the humidity of the air is too low. The pit storage or cave storage is very satisfactory for this crop.

Sweet potatoes. These must be well ripened and cured. After digging, cure them for two weeks in a warm, dry atmosphere, then store in a dry moderately cool place where the temperature is 55° to 60° F. Pit and cave storages are not suitable for sweet potatoes. A room in the basement partitioned off from the furnace is more suitable.

Squash and Pumpkins. It is the usual practice to store these in a warm place. This is a mistake. They should be stored under conditions somewhat similar to sweet potatoes. If ripe when harvested no curing is necessary. The storage must be dry and should range in temperature between 40° and 50° F. A room like that recommended for sweet potatoes will answer the purpose, altho a lower temperature is better.

Parsnips, Parsley, Salsify (Vegetable Oyster) and Horse-radish. These may be dug and stored the same as beets, carrots and turnips. However, they can stand in the ground where grown all winter. After they have frozen solid in the ground they should be covered to prevent thawing. Alternate freezing and thawing will destroy them, but severe freezing will not injure them if they are

not allowed to thaw out till spring. However, it is easier to remove them from a pit storage than to dig them from frozen ground, and, accordingly, pit storage is recommended.

Celery, Endive and Head Lettuce. These may be dug with roots attached and planted in earth in a cave or cool cellar and with occasional watering may be held until about Christmas.

Tomatoes. Tomatoes may be kept until Thanksgiving by picking well matured green tomatoes just before frost. Wrap in paper and place on a fairly dry shelf in a temperature of 50° to 60° F. The furnace room is all right if the temperature does not go above 60° F. The vines may be pulled before frost and hung up and the green fruits allowed to ripen on the vines. A little better product is secured this way. The vines should be hung in a room where the temperature is 50° to 60° F.

Garlic. Handle the same as onions.

Ground Cherries. Store in the husk in thin layers in a dry place free from frost.

The following bulletins and circulars pertaining to the vegetable garden may be secured from the Bulletin Editor, Iowa Agricultural Experiment Station, Ames, Iowa.

Insect Enemies of Melons and Cucumbers in Iowa. Circular No. 90.
Control of Armyworms and Cutworms. Circular No. 101
Common Garden Insects. Circular No. 44
Cabbage Diseases. Circular No. 46
The Onion Industry in Pleasant Valley, Iowa. Agr. Exp. Sta. Bul. No. 225

The following farmers' bulletins pertaining to the vegetable garden may be secured from the United States Department of Agriculture, Washington, D. C.

Asparagus .....Farmers' Bulletin No. 829
Home Storage of Vegetables.....Farmers' Bulletin No. 879
Sweet Potato Growing .....Farmers' Bulletin No. 999
Production of Late or Main Crop
Potatoes .....Farmers' Bulletin No. 1064
How to Grow an Acre of Potatoes.....Farmers' Bulletin No. 1190
Celery Growing .....Farmers' Bulletin No. 1269
Cabbage Diseases .....Farmers' Bulletin No. 1351
Diseases and Insects of Garden
Vegetables .....Farmers' Bulletin No. 1371
Vegetable Seeds for the Home and
Market Garden .....Farmers' Bulletin No. 1390
Watermelons .....Farmers' Bulletin No. 1394
Muskmelons .....Farmers' Bulletin No. 1468
Cucumber Growing .....Farmers' Bulletin No. 1563.